

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

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TOWN OF HEMPSTEAD,

Plaintiff,

-against-

UNITED STATES OF AMERICA, et al.

Defendants.
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**DECLARATION OF
WILLIAM D. MERKLIN, P.E.**

Civil Action No.: 16-cv-03652
(ENV)(SLT)

WILLIAM D. MERKLIN, hereby declares, pursuant to 28 U.S.C. §1746, under penalty of perjury, that the following is true and correct:

1. I am a Senior Vice President of D&B Engineers And Architects, P.C. (formerly known as Dvirka & Bartilucci Engineers And Architects, P.C.) ("D&B") and have been employed with D&B since 1995, initially as a project engineer then I was promoted to associate, then senior associate, then vice president, and then senior vice president. D&B is a multidiscipline firm with a focus in practice areas including water supply engineering, architecture, civil engineering, construction management, electrical engineering, energy engineering, environmental investigation and remediation, solid waste management and wastewater management. D&B is an engineering consultant to the Department of Water ("DOW") of the Town of Hempstead ("Town"), which operates six public utility water districts, including the Levittown Water District ("LWD") which serves a primarily residential area in Nassau County, New York with approximately 50,000 residents.

2. In mid-2013, DOW detected increasing levels of hazardous substances in three public water supply wells in LWD. Of paramount importance to DOW was ensuring that the drinking water it was providing to its residents complied with the applicable drinking water

quality standards and ensuring that the water demands of the LWD were able to be met. As a result, DOW solicited a proposal from D&B to determine the necessary treatment for removal of volatile organic compounds ("VOC") from the water source at LWD Wells 7A, 8A and 13 (collectively, the "LWD Wells"). I served as the Project Manager for the design and construction of treatment facilities suitable to remove the contamination at the LWD Wells. I submit this Declaration in support of the Town's opposition to the defendants' respective motions for summary judgment and seeking to exclude my testimony as an expert witness in this action.

3. I am a Professional Engineer licensed in both New York and California with 30 years of experience. I attained a Bachelor of Engineering (Civil) degree from Manhattan College in 1989 and a Master of Engineering (Environmental) degree from Manhattan College in 1991. I manage the Water Supply Division and, since 2016, the Civil Engineering Division at D&B. I specialize in water supply engineering and have extensive project experience in master planning and design for water supply treatment. I have designed and prepared plans and specifications for the construction of water supply wells, packed tower aeration systems ("PTAS"), granular activated carbon ("GAC") systems, advanced oxidation process, well house pumping stations, iron and manganese filtration facilities, water storage tanks, chemical storage facilities, booster pumping stations, distribution system piping, master plans and capital plans, annual water quality reports, and emergency response plans.

4. My responsibilities include technical and economic evaluations, preliminary engineering, contract document preparation, construction cost estimating, preparation of engineering reports, permits and applications to regulatory authorities, technical evaluations, and reporting to the client. With respect to drinking water treatment systems, I design, assist with permitting, assist with the bidding process, assist with design services during construction and

construction inspection, and provide assistance during startup of the systems. My experience includes work for numerous municipalities, water suppliers and other public agencies, and private clients. I have served as the Engineer of Record for various villages and water suppliers throughout Nassau County for more than two decades, including at least five public water supply districts. I am an active member of the American Water Works Association and the Long Island Water Conference. My curriculum vitae is included as Exhibit A to the Expert Report, dated August 6, 2019, which I prepared on behalf of the Town in this action. My Expert Report includes as exhibits the Design Report for Packed Tower Aeration System for LWD Wells 7A and 8A, dated August 2014 and revised February 2016 (the "Well 7A/8A Design Report") and the Design Report for Packed Tower Aeration System for LWD Well 13, dated August 2014 and revised February 2016 (the "Well 13 Design Report" and together with the Well 7A/8A Design Report, the "Design Reports"). My Expert Report also includes the LWD Well 13 Contract Plans and Specifications, dated November 2014, and the LWD Wells 7A and 8A Contract Plans and Specifications, dated February 2015. See Exhibit "6" for a copy of my Expert Report with my curriculum vitae and the Design Reports attached thereto.¹

5. D&B has designed and implemented over 20 PTAS and GAC treatment systems for water suppliers in Nassau County, New York, including the public water suppliers and municipalities identified in my Expert Report in this matter. I personally have designed numerous water treatment facilities on Long Island, including PTAS treatment systems similar to the PTAS designed and constructed to treat the groundwater contamination in the LWD Wells.

6. As a public water supplier, LWD is regulated by the New York State Department of Health ("NYSDOH") and the Nassau County Department of Health ("NCDOH"). The

¹Due to their length, the contract plans and specifications for the PTAS for the LWD Wells are not included herewith. Those documents can be separately provided if the Court requires them.

NYSDOH generally delegates its authority to the local county Departments of Health regarding compliance with drinking water quality standards. Drinking water system monitoring and reporting is governed by the New York State Sanitary Code Subpart 5-1, Article VI of the Nassau County Public Health Ordinance and the requirements imposed by the United States Environmental Protection Agency ("EPA") and by water quality monitoring requirements issued by the NCDOH. Those requirements establish maximum contaminant level ("MCL") standards for water quality which cannot be exceeded in drinking water. A water supply well cannot be operated above an MCL. The NCDOH issues water quality monitoring requirements which provide parameters for when public water supply wells should be taken out of service and for when engineering plans should be submitted to the NCDOH for the installation of chemical removal treatment of VOCs in source water detected in public water supply wells.

7. Under the NCDOH water quality monitoring requirements, most principal organic contaminants have an MCL equal to 5.0 micrograms per liter (ug/l).² The NCDOH water quality monitoring requirements provide that once contaminants are detected in public supply wells at 80% of the MCL, NCDOH strongly recommends that the well be taken out of service and in order to remain in service, additional testing is required and engineering plans should be submitted to NCDOH for the installation of chemical removal treatment of the detected contaminants. See e.g. Exhibit "9", NCDOH 2012 Water Quality Monitoring Requirements, Table 1-3(i) (TOH008977, 8987-88). Once contaminants are detected in public water supply wells at 50% of the MCL, additional testing is implemented. Id. at Table 1-3(g). In my experience, and consistent with industry practice, as contaminants are detected in public supply wells at or around 50% of the MCL, it is prudent for public water suppliers to begin planning for

² Micrograms per liter (ug/l) is synonymous with parts per billion or "ppb".

wellhead treatment to remove those contaminants from the source water supply wells in an effort to ensure the continued operation of the impacted public water supply wells. If the contaminants are at or around 80% of the MCL, and consistent with the NCDOH water quality monitoring requirements, the supply wells would be taken out of service until wellhead treatment was installed.

8. In addition, pursuant to Article VI, § 4 of the Nassau County Public Health Ordinance, the NCDOH must approve all construction plans for modifications of treatment systems for public water supply wells based on standards set by the NYSDOH.

9. In or about mid-2013, I am aware that water quality testing samples in the raw water detected increasing levels of VOCs, including Freon-113, in the LWD Wells nearing the MCL of 5 ug/l. Since the continued operation of the LWD Wells was critical to meet the demands of the LWD, and to ensure compliance with the drinking water quality standards, DOW solicited a proposal from D&B to determine the necessary treatment for removal of the VOCs from the water source at the LWD Wells. DOW provided sampling data to D&B of the raw water samples in the LWD Wells so that we would know what VOCs were being detected in the LWD Wells. See e.g. Exhibit "9" for representative samples of the water quality sampling test results for the raw water in the LWD Wells for the 2013 time period. In or about June 2013, I, on behalf of D&B, prepared a proposal to DOW for engineering services associated with the design and construction of VOC treatment at the LWD Wells. By Resolution, dated June 18, 2013, the Town Board accepted the proposal of D&B to establish the best methods for treating the VOC contamination in the LWD Wells and to submit the design plans and specifications produced for the best treatment alternative to the NCDOH for approval. See Exhibit "___", Town Board Resolution No. 774-2013 (TOH006362).

10. As Project Manager, my main focus was determining the best course of action to remove as expeditiously as possible the VOC contaminants from the LWD Wells to ensure the continued operation of the LWD Wells to meet the water demands of the LWD and to ensure that the drinking water distributed from the LWD Wells complied with all applicable drinking water quality standards. The primary goal of the project was the protection of the drinking water provided to the public and not the remediation of a hazardous waste site.

11. LWD Wells 7A and 8A are situated in the same well field about 100 feet apart located near Bowling Lane in Levittown, New York. LWD Well 7A (also known by ID Number N-08279) is 547 feet deep and is screened in the Magothy Aquifer. The Magothy Aquifer is the primary source of public water supply on Long Island. LWD Well 8A (also known by ID Number N-7523) is 682 feet deep and is also screened in the Magothy Aquifer. LWD Well 13 is located less than one-half mile away from LWD Wells 7A/8A on Entry Lane and Wantagh Avenue in Levittown, New York. LWD Well 13 (also known by ID Number N-5303) is 741 feet deep and is screened in the Magothy Aquifer.

12. In determining the appropriate type of treatment for removing VOCs at a public supply well, my team and I at D&B would typically review the concentrations of the VOCs; review the water quality parameters other than the VOC concentrations, including whether there is iron, manganese or nitrates in the samples which could impact the particular treatment methodology; and review whether the specific contaminants at issue can be treated with each of the common treatment methods. In 2013, in Nassau County, New York, PTAS and GAC were the most common wellhead treatment systems for removal of VOC contaminants (like the contaminants in the LWD Wells) from water supply wells. Other alternatives would also be considered, including abandoning the water supply well and installing a new supply well

somewhere else or purchasing water from a neighboring water supplier. Blending the water in the impacted water supply well to reduce the concentrations of VOCs is only permitted for nitrates and not for the VOCs detected in the LWD Wells.

13. In addition, my team and I would look to see if the source of the contamination could be determined so that we could estimate what the maximum influent concentration might be at some time in the future.³ Here, D&B utilized Environmental Data Resources, Inc. ("EDR") to conduct a radius search of known environmental contamination sites within a two-mile radius of the LWD Wells. On or about August 7, 2013, EDR provided D&B with The EDR Radius Map Report with GeoCheck (the "EDR Report") detailing its search of available environmental records from federal and state databases, including the EPA and the New York State Department of Environmental Conservation ("NYSDEC"), for sites with environmental contamination and cleanup. Within the two-mile radius search, the EDR Report identified a portion of the Northrop Grumman site in Bethpage, New York known as Northrop Grumman Steel Los Plant 2 as a state hazardous waste site. See Exhibit "12" for the relevant portions of the EDR Report referencing the Northrop Grumman site. The EDR Report referenced that the Northrop Grumman Steel Los Plant 2 site was formerly part of the Northrop Grumman site in Bethpage which was split into NYSDEC Sites 130003A, 130003B and 130003C. Id. at D&B004814-4815.

14. The EDR Report also referenced that, "Remedial alternatives were developed for addressing groundwater contamination emanating from this site and the NWIRP-Bethpage site"; that "Operation, maintenance and monitoring continues and is ongoing"; and that "Groundwater has been impacted at and downgradient of this site." Id. Reference was made to see "the Grumman Aerospace (130003A) and NWIRP Bethpage (130003A) site descriptions for more

³ In the context of wellhead treatment systems, the influent would be the compound which is flowing into the raw water of the supply well.

information." Id. at D&B004815. Moreover, the Overview Map of sites with environmental contamination and cleanup which was included in the EDR Report extended onto the Northrop Grumman site in Bethpage, New York. Id. at D&B4680.

15. The EDR Report confirmed the general information we had at D&B about the groundwater plume associated with the Northrop Grumman site and the Naval Weapons Industrial Reserve Plant ("NWIRP") site in Bethpage, New York, commonly known as the "OU-2 plume" (which was commingled with contamination from the adjacent Hooker/Ruco site) and which was a little more than two miles away and upgradient from the LWD Wells. D&B also reviewed the NYSDEC database for known Superfund sites, which would have included the area west of the Northrop Grumman, NWIRP, and Hooker/Ruco sites, and did not determine any potential sources for the contamination of the LWD Wells. If there was a known source or contamination site outside of a two-mile radius, we would have also looked at that if the site was upgradient or significant for some other reason and we did not uncover any viable sources. LWD Wells 7A and 8A are located approximately 2.25 miles south, southwest from the Northrop Grumman site and LWD Well 13 is located approximately 2.5 miles south, southwest from the Northrop Grumman site. At that time, the commingled OU-2 plume had migrated several miles south off-site.

16. In addition, I am generally aware of the New York State Source Water Assessment Plan ("SWAP") prepared by the NYSDOH to estimate the potential for contamination of public water supplies and the SWAP Community Well Assessment Reports which NYSDOH and NCDOH prepared for the Town's public supply wells, including the LWD Wells. I am aware that DOW utilizes the SWAP data to help identify priorities for public water supply protection and that the SWAP maps prepared by or on behalf of NYSDOH and NCDOH

for the LWD Wells depict the area that contributes recharge for those wells and that the contributing area of the LWD Wells goes directly through the Northrop Grumman and NWIRP sites. See Exhibit "10" (SWAP Maps for LWD Wells).

17. Having determined that the OU-2 plume was the likely source of the VOC contamination of the LWD Wells, I requested information from NYSDEC regarding the OU-2 plume in order to design proper treatment for the LWD Wells. In particular, on August 19, 2013, I sent an email to Jim Harrington, Director of Remedial Bureau of the NYSDEC as the contact person for the OU-2 plume, and informed him: i) that D&B had been retained by the Town to plan and design wellhead treatment for the LWD Wells based on detections of VOCs in those wells, including Freon-113 in both well locations and 1,1-DCA and PCE in the LWD Well 7A/8A location; ii) that in order to design proper wellhead treatment, I needed to predict how high VOC concentrations may rise over time from the OU-2 plume; and iii) that I was requesting data and information regarding Outpost Monitoring Wells BPOW 4-1 and 4-2 which had been installed to provide early warning of the arrival of the OU-2 plume at LWD Well 13, including sampling data for Outpost Monitoring Wells BPOW 4-1 and 4-2, confirmatory sampling results for exceedances of the trigger value for wells BPOW 4-1 and 4-2, and any information regarding recent modeling predicting concentrations of VOCs at the LWD Wells. See Exhibit "13", D&B000846-849.

18. D&B subsequently obtained some data and reports from and through the NYSDEC evidencing that the contaminants detected in the LWD Wells were the same contaminants which were known to be emanating from and associated with the OU-2 plume and which had also been discovered in monitoring wells throughout the area of the growing OU-2 plume migrating off-site, then over 3,000 acres in size, and extending into the deep Magothy

Aquifer, including to the depths of the screen zones of the LWD Wells. In particular, we obtained groundwater monitoring reports for the OU-2 plume prepared by or on behalf of Northrop Grumman and the Navy which had been submitted to NYSDEC covering the following time periods: i) First Quarter, Second Quarter, Third Quarter, and Annual for 2010; ii) Third Quarter for 2011; First Quarter, Third Quarter and Annual for 2012; and regional sampling groundwater test results for the period April to August 2013. See Exhibit "27" for relevant portions of those documents. Those documents corroborated the determination that the commingled OU-2 plume was the likely source of contamination of the LWD Wells and assisted my team and I in determining the design parameters for the wellhead treatment systems to remove the VOCs from the LWD Wells.

19. Each of the quarterly and annual groundwater monitoring reports obtained by D&B contained maps of the Northrop Grumman, NWIRP and Hooker/Ruco sites together with the groundwater monitoring wells for the OU-2 plume installed by or on behalf of Northrop Grumman and the Navy. Each of those maps from the 2010-2013 time period included LWD Well 13 and the Outpost Monitoring Wells BPOW 4-1 and 4-2 and indicated a dearth of groundwater monitoring wells located on the western boundary area of the OU-2 plume, which is the area closest in proximity to the LWD Wells. In fact, as depicted on the above-referenced maps, the groundwater monitoring wells in closest proximity to the LWD Wells were GM-34D and GM34-D2, located approximately 1 mile north and northeast of the LWD Wells. See Exhibit "27" at D&B003838.

20. The OU-2 groundwater monitoring reports obtained by D&B provided information regarding the various groundwater monitoring wells installed to monitor the off-site groundwater impacted by the commingled OU-2 plume and contained data showing the

concentration of VOCs detected in the various monitoring wells. That data contained tables which included the following information: the specific constituent VOCs being tested; the NYSDEC Standards, Criteria and Guidance ("SCG")⁴ values for each of the constituent VOCs; the identity of the particular monitoring wells; the date of sampling of those wells; and the concentration amounts of the constituent VOCs detected in those monitoring wells measured in micrograms per liter (ug/l or ppb). All of the OU-2 groundwater monitoring reports included as constituents the following VOCs: Freon-113; 1,1-Dichloroethane ("1,1-DCA"); Chloroform; Tetrachloroethene ("PCE"); and Trichloroethylene ("TCE") - each of the VOCs detected in some measure in the LWD Wells. In addition, the SCG values on each of the OU-2 groundwater monitoring reports for Freon-113, 1,1-DCA, PCE, and TCE are 5 ug/l, with Chloroform at 7 ug/l. See generally Exhibit "27" (2010-2013 groundwater monitoring reports).

21. The OU-2 groundwater monitoring reports obtained by my team and I helped us estimate what the maximum influent concentration might be at some time in the future for purposes of designing the proper treatment facilities for the LWD Wells. The maximum influent concentration means what concentration amounts of the VOCs from the OU-2 plume could be estimated to impact the LWD Wells in the future so that the proper treatment could be designed. In designing the appropriate wellhead treatment for the LWD Wells, my team and I reviewed the groundwater monitoring data for all of the monitoring wells contained in the various reports identified above, noting the data for those OU-2 monitoring wells in closest proximity to the LWD Wells as well as those monitoring wells with the highest VOC concentrations, including GM-34D and GM-34D2 as well as GM-38D and GM-38D2 located to the east of the GM-34 monitoring wells.

⁴ "SCG" is defined in the monitoring reports as Standards, Criteria, and Guidance values based on NYSDEC Technical and Operational Guidance Series standards for groundwater.

22. From the OU-2 groundwater monitoring data for the period from February 2010 through June 2013, the following range of VOCs were detected in the referenced monitoring wells:

GM-34D:	TCE ranged from 310 ppb to 510 ppb Freon-113 ranged from 6.6 ppb to 12 ppb PCE ranged from 4.8 ppb to 7.9 ppb 1,1-DCA ranged from .88 ppb to 1.1 ppb
GM-34D2:	TCE ranged from 120 ppb to 300 ppb Freon-113 ranged from 1.5 ppb to 3.8 ppb PCE ranged from 5.2 ppb to 12 ppb 1,1-DCA ranged from .34 ppb to .53 ppb
GM-38D:	TCE ranged from 410 ppb to 870 ppb Freon-113 ranged from 1.8 ppb to 2.7 ppb PCE ranged from 10 ppb to 16 ppb 1,1-DCA ranged from .58 ppb to 6 ppb
GM-38D2:	TCE ranged from 27 ppb to 370 ppb Freon-113 ranged from .38 ppb to 2 ppb 1,1-DCA ranged from .64 ppb to 4.2 ppb

See Exhibit "27" (groundwater monitoring results, D&B003584-85, 3831-32, 3843, 3854-55, 3865, 3877-3878, 3891, 3931-32, 4244-45). In addition, in June 2013, monitoring well RW3-MW3, located adjacent to GM-38D, had a TCE detection of 410 ppb. Id. (D&B004264).

23. Also in June 2013, Northrop Grumman and the Navy conducted comprehensive groundwater sampling of monitoring wells, remedial wells, and public supply wells, including LWD Well 13, which data was in their possession. See Comprehensive Groundwater Sampling, Table 1 (D&W004267-4269). At that time, in addition to monitoring wells GM-34D and GM-34D2, groundwater data was also provided with respect to monitoring wells TT-101D, TT-101D1 and TT-101D2, also upgradient and closest in proximity to the LWD Wells. See Exhibit "28", Figure 1 (D&B004390). For sampling in June 2013, monitoring well TT-101D had detections of TCE at 73 ppb, 1,1-DCA estimated at .80 ppb, Chloroform estimated at .43 ppb,

PCE estimated at .64 ppb and Freon-113 at 12 ppb; monitoring well TT-101D1 had detections of TCE at 160 ppb, 1,1-DCA estimated at .45 ppb, Chloroform estimated at .91 ppb, PCE estimated at .45 ppb and Freon-113 at 12 ppb; and monitoring well TT-101D2 had detections of TCE at 460 ppb, Chloroform estimated at .56 ppb, PCE estimated at .80 ppb, and Freon-113 at 11 ppb. See Exhibit "29", Comprehensive Groundwater Sampling, Table 1 (D&B004254).

24. In addition, also included in the material obtained by D&B was a map prepared by the consultant for the Navy identified as "Operable Unit 2 (Site 1) Groundwater Total Volatile Organic Compound, NWIRP, Bethpage, New York," dated October 5, 2009, which shows the total volatile organic compound ("TVOC") iso-concentration contour of the OU-2 plume at that time in or about 2009. See Exhibit "30", Figure 1, October 5, 2009, D&B003824. That map, from in or about October 2009, depicts the OU-2 plume abutting Outpost Monitoring Wells BPOW 4-1 and 4-2 with a trajectory which appears to be approaching LWD Well 13. Id.

25. Furthermore, the 2010 Annual Groundwater Monitoring Report for OU-2, dated March 30, 2011, obtained by D&B, indicated that, "Well GM-33D2 located along the southwestern boundary of the Northrop Grumman site, exhibited three VOCs (i.e, Freon 113, TCE, and PCE, see Table 7) that exceeded SCGs in this period, with similar exceedances occurring the first three quarters of Year 2010." See, Exhibit "27", 2010 Annual Groundwater Monitoring Report, OU-2, dated March 30, 2011, p. 9 (D&B003567). That means that in 2010, a monitoring well "along the southwestern boundary of the Northrop Grumman site" was still exhibiting detections of Freon 113 (at 6.3 ppb). Id. at Table 7 (D&B003585). The 2010 Annual Groundwater Monitoring Report for OU-2 also stated that, "Well GM-34D2 continues to exhibit an increasing level in TVOC concentrations" Id. at p. 9 (D&B003567). With respect to Outpost Monitoring Wells BPOW 4-1 and 4-2 (installed to provide early warning of the impact of the

OU-2 plume to LWD Well 13), the 2010 Annual Groundwater Monitoring Report stated that, "Freon 113 was detected in Wells OW4-1 and OW4-2 but at concentrations less than its respective SCG and trigger value." Id. at p. 10 (D&B003568).

26. Thereafter, the 2012 Annual Groundwater Monitoring Report for OU-2, dated March 19, 2013, stated once again that, "Well GM-33D2 located along the southwestern boundary of the Northrop Grumman site, exhibited three VOCs (i.e., Freon 113, TCE and PCE, see Table 7) that exceeded SCGs in this period, with similar exceedances occurring in the First, Second and Third Quarters of 2012." See 2012 Annual Groundwater Monitoring Report, OU-2, dated March 19, 2013, p. 9 (D&B003912). That monitoring report also acknowledged that, "Freon 113 was detected in Wells BPOW 4-1 and BPOW 4-2 but at concentrations less than its respective SCG but above the trigger value." Id. at p. 11(D&B003914). It was also noted that sampling from December 2012, indicated that both outpost monitoring wells BPOW 4-1 and BPOW 4-2 met the trigger value of at least 1.5 ppb of Freon-113 with BPOW 4-2 also indicating a detection of TCE estimated at .25 ppb. Id. at Table 8 (D&B003936). In December 2012, outpost monitoring well BPOW 4-2 (installed to provide early warning to LWD Well 13 of the impact from the OU-2 plume) had detections of Freon-113 at 1.5 ppb and TCE estimated at .25 ppb. Id.

27. Five months later, in May 2013, outpost monitoring well BPOW 4-1 had a Freon-113 detection estimated at 3.8 ppb while well BPOW 4-2 had detections of Freon-113 estimated at 1.5 ppb and TCE estimated at .30 ppb. See Comprehensive Groundwater Sampling, Table 1 (D&B004279). The detections of TCE in outpost monitoring well BPOW 4-2 in 2013 suggested that TCE from the OU-2 plume was potentially advancing toward the LWD Wells.

28. I have been advised that my August 19, 2013 email correspondence to NYSDEC (stating that D&B had been retained by the Town to plan and design wellhead treatment for the LWD Wells and requesting information regarding the OU-2 plume in order to design proper treatment for the LWD Wells) was forwarded that same day to representatives of Northrop Grumman and the Navy. See Exhibit "14" (TOH-ARCADIS 000009938-40). In addition, I have also been advised that on August 23, 2013, Steven Scharf, the project engineer from NYSDEC, provided representatives of Northrop Grumman and the Navy with a copy of a map prepared by D&B depicting the LWD Wells, informing them that "both well fields have now been impacted with Freon 113, amongst other VOCs in the low PPB range." See Exhibit "31" (NYSDEC000000059-60). No representative from or acting on behalf of Northrop Grumman or the Navy communicated with me or anyone at D&B after receiving the August 2013 correspondence to discuss the issue of VOC contamination and/or the need for wellhead treatment at the LWD Wells.

29. On November 4, 2013, I spoke with Steven Scharf from the NYSDEC regarding the information request I had sent in August 2013 for the Northrop Grumman and NWIRP sites. Later that same day, Mr. Scharf from NYSDEC sent me an email acknowledging that "NYSDEC has satisfactorily responded to all of the documents D&B, on behalf of the Town of Hempstead (aka Levittown Water District), has currently requested." See Exhibit "32" (NYSDEC0000000063). In his email of November 4, 2013, Mr. Scharf also acknowledged that D&B was in the process of preparing a basis of design report for the treatment of Freon-113 impacting the LWD Wells, noting that "[t]his report should be ready in the near future for DOH review." Id. That would be consistent with the role of DOH as the agency with oversight over the public water drinking supply. Mr. Scharf also noted that D&B had agreed to supply

NYSDEC with a copy of the design report as well. Id. Representatives of both Northrop Grumman and the Navy were copied on Mr. Scharf's email to me on November 4, 2013. However, at no time did any representative from or acting on behalf of Northrop Grumman or the Navy ever communicate with me or anyone at D&B to initiate discussions or to discuss the issue of VOC contamination and/or the need for wellhead treatment at the LWD Wells.

30. I am aware that for periods of time, as the levels of VOCs in the LWD Wells were increasing, the LWD Wells were removed from service at various times to ensure that the wells would not violate drinking water quality standards.

31. The OU-2 groundwater monitoring data and reports obtained by D&B helped guide me and my team in determining the maximum influent concentrations in order to design the wellhead treatment for the removal of VOC contamination from the LWD Wells.

32. In August 2014 (and subsequently slightly revised in February 2016 primarily to address GAC treatment for the off-gas emissions from the packed tower), my team and I prepared the Design Reports recommending PTAS wellhead treatment for the removal of the VOC contamination from the LWD Wells. The Design Reports were intended to provide to the Town and NCDOH (as the regulatory agency with jurisdiction over public water supply systems in Nassau County) the requisite detail concerning the nature of the VOC contamination in the LWD Wells, the recommended treatment to remove the VOC contamination, and the estimated costs to construct and operate the treatment facilities. In particular, the respective Design Reports: i) provided the background on each of the LWD Wells; ii) explained the water quality history and nature of the contamination found in each of the LWD Wells; iii) described the process by which D&B determined that the OU-2 plume was the likely source of contamination of the LWD Wells; iv) prepared a treatability evaluation concerning the contaminants detected in

the LWD Wells; v) explained the proposed PTAS treatment system being recommended for the LWD Wells; and vi) provided a cost estimate for the construction and operation of the proposed treatment systems for the LWD Wells. See Exhibit "6" (Design Reports).

33. Due to the concentrations of Freon-113 nearing the MCL of 5.0 ug/l for that compound in LWD Wells 8A and 13, as well as the increasing concentrations of VOCs in LWD 7A, D&B deemed it necessary to design and construct treatment facilities for the removal of VOCs from the water source at the LWD Wells in order for LWD to continue to provide an adequate supply of water to the distribution system into the future and to provide drinking water to the residents of the LWD in compliance with drinking water quality standards.

34. In the Design Reports, which I prepared with assistance from my team, I referenced: i) that D&B had obtained various groundwater reports from the NYSDEC regarding the OU-2 plume; ii) that based on those reports it appeared to D&B that the LWD Wells were located along the southern and southwestern edges of the OU-2 plume; iii) that there were few groundwater monitoring wells monitoring the OU-2 plume located in the immediate vicinity of the LWD Wells; iv) that the closest groundwater monitoring wells for the OU-2 plume were GM-34D and GM-34D2, located approximately 1 mile north and northeast from the LWD Wells; v) that those monitoring wells were screened in the Magothy Aquifer and showed consistent elevated VOC concentrations of almost 200 ppb; and vi) that the VOCs detected in the LWD Wells were present in the GM-34D and GM-34D2 monitoring wells. See Exhibit "6" [Well 7A/8A Design Report, p. 2-6 and Well 13 Design Report, p. 2-5]. That information was consistent with the data and reports referenced above from the OU-2 groundwater monitoring wells for the 2010 through 2013 time period.

35. In addition, the Design Reports referenced that D&B reviewed the analytical data for the Outpost Monitoring Wells BPOW 4-1 and 4-2, which were specifically installed upgradient of LWD Well 13 to provide a warning of the arrival of the OU-2 plume at LWD Well 13, and that data revealed: i) that in early 2012, the trigger value for Freon-113 was confirmed in Outpost Monitoring Well BPOW 4-1; ii) that by the second quarter of 2013, both Outpost Monitoring Wells BPOW 4-1 and 4-2 exceeded the trigger value of 1.5 ppb for Freon-113; and iii) that the Freon-113 detections in Outpost Monitoring Wells BPOW 4-1 and 4-2 was present at similar depths as the screen zones of the LWD Wells. Id. [Well 7A/8A Design Report, pp. 2-7 and 2-8 and Well 13 Design Report, pp. 2-6 and 2-7].

36. Based on our analysis, I concluded that PTAS would effectively and efficiently treat the VOCs detected in the LWD Wells. Id. [Well 7A/8A Design Report, p. 3-1 and Well 13 Design Report, p. 3-1]. That conclusion was based on my extensive experience with water supply engineering and designing many wellhead treatment systems for removal of VOC contamination from public supply wells; the nature of the VOC contamination impacting the LWD Wells; the concentration levels of the same VOCs detected in groundwater monitoring wells in the OU-2 plume deemed to be the likely source of the VOC contamination in the LWD Wells; the trigger value for Freon-113 being reached in the OU-2 outpost monitoring wells BPOW 4-1 and 4-2 installed specifically to provide early warning of the impact of the OU-2 plume to LWD Well 13; and understanding that wellhead treatment is designed to continue to effectively treat the impacted water supply wells in the worst case scenario as concentration levels of the VOCs potentially change over the course of time.

37. In general, PTAS - packed tower aeration, also known as air stripping technology, is an aeration process which encourages the transfer of VOCs found in groundwater from the

aqueous phase to the gas phase. With PTAS, water is distributed over the top of the unit while air is forced upward through the bottom and loosely fitted packing material serves to increase the air/water interface area to provide maximum mass transfer. During the air stripping process, the contaminants are transferred from the water to the air so that the water coming out is no longer contaminated. The air is discharged either out of the top of the air stripper to the atmosphere or it could be treated with activated carbon before it's discharged in the atmosphere. Since air stripping removes the contaminants from the water and concentrates them in the off-gas, the off-gas may require treatment by other means, such as GAC adsorption. Generally, PTAS is used to treat VOCs from a source of water.

38. The VOCs in LWD Wells 7A and 8A, including Freon-113, 1,1-DCA, and PCE, as well as the Freon-113 detected in LWD Well 13, exhibited an increasing trend since low level concentrations were detected by the Town in or about 2012. Based on our review of the groundwater monitoring data and reports regarding the OU-2 plume, my team and I were concerned that the trend would continue with the VOCs potentially exceeding the MCL. Prior to commencing with this project, the LWD Wells did not require any treatment for contaminant removal. In conjunction with the fact that many monitoring wells in the OU-2 plume had high detections of TCE in excess of 400 ppb, including the GM-34D and GM-38D monitoring wells as set forth above, my team and I determined that if the OU-2 plume continued to migrate off-site as expected, that the TCE could potentially impact the LWD Wells, as evidenced by the low level TCE concentrations being detected in outpost monitoring well BPOW 4-2. Based on my extensive experience and my understanding of water supply engineering practice, a water treatment facility should be designed to treat the highest possible future contamination concentration anticipated so that it will be effective for as long as necessary.

39. Here, my team and I identified the VOC contaminants already detected and anticipated VOC contaminants to impact the LWD Wells and estimated the potential maximum influent concentrations which could impact the raw water in the LWD Wells. As such, with respect to LWD Wells 7A and 8A, my team and I determined the potential maximum influent concentrations for the PTAS treatment facility to be TCE (at 420 ppb) Freon-113 (at 8.6 ppb), PCE (at 12 ppb), and 1,1-DCA (at 5.8 ppb). See Exhibit "6" [Well 7A/8A Design Report, p. 3-3]. With respect to LWD Well 13, my team and I determined the potential maximum influent concentrations for the PTAS treatment facility to be TCE (at 420 ppb) and Freon-113 (at 8.6 ppb). Id. [Well 13 Design Report, p. 3-3].⁵

40. My team and I also concluded that the LWD Wells would also eventually need to treat the off-gas emitted from the PTAS and that the best option to achieve that would be vapor phase activated carbon to adsorb and remove the VOCs from the off-gas emissions. See Exhibit "6" [Wells 7A/8A Design Report, p. 3-5 and Well 13 Design Report, p. 3-5].

41. My team and I also evaluated other alternatives to PTAS treatment at the LWD Wells, including installation of a GAC adsorption treatment plant and the drilling of a new well elsewhere in the LWD. GAC - granulated activated carbon, is a type of media that you would put into a filter vessel and pass the contaminated water through and the contaminants would be absorbed onto the carbon media. Once the carbon is expended after a period of time, it would be removed and disposed of in accordance with the regulatory requirements. However, because of the high concentrations of TCE observed in the OU-2 plume monitoring wells and the presence of Freon-113 in the LWD Wells, my team and I determined that GAC adsorption treatment for

⁵ There is a practical size for air strippers such that even if the air strippers for the LWD Wells were designed using lower maximum influent concentrations, it would not have been a significant difference.

the LWD Wells was not a viable option for treatment. That was because Freon-113 and 1,1-DCA cannot be readily treated by GAC adsorption and the operating cost for replacing the GAC media would be significant due to the high design concentrations of TCE in the source water. Having designed other VOC treatment facilities, I was familiar with the limitations of GAC for treatment, especially as it relates to Freon-113.

42. In addition, my team and I determined that installing a new well at a different site within the LWD was also not a viable treatment option to PTAS since any new wells would require the LWD to purchase additional property on which to site the wells which would amount to a larger capital cost than the proposed improvements to the existing sites; sections of the LWD were in the likely path of the OU-2 plume and would thus be unsuitable as a new water source without treatment similar to that to be installed at the LWD Wells; and the presence of nitrates at some locations within the LWD where existing wells have been abandoned. See Exhibit "6" [Wells 7A/8A Design Report, p. 3-6 and Well 13 Design Report, p. 3-6].

43. On the other hand, since all of the VOCs found in the LWD Wells could be readily treated by PTAS, I concluded to a reasonable degree of engineering certainty that PTAS with a vapor phase GAC adsorption system for off-gas treatment was the preferred treatment alternative for removal of the VOC contamination from the LWD Wells. [Wells 7A/8A Design Report, pp. 3-5 and 3-6 and Well 13 Design Report, pp. 3-5 and 3-6]. I am aware of a multitude of wellhead treatment facilities in Nassau County for treating VOC contamination in water supply wells, not designed by D&B, where the preferred treatment chosen was PTAS (and where needed with GAC adsorption to treat the off-gas emission from the packed towers). In fact, I am aware that Northrop Grumman and the Navy utilize PTAS treatment systems as part of their remediation of the on-site and off-site VOC contamination associated with the Northrop

Grumman and the NWIRP sites and both Northrop Grumman and the Navy have reimbursed other water suppliers in Nassau County for PTAS treatment facilities designed and constructed to remove VOC contamination associated with the OU-2 plume from impacted water supply wells in those water districts.

44. The PTAS for LWD Well 13 was designed for a flow rate of 1,200 gallons per minute ("GPM") with a single packed tower, a concrete clearwell below the tower, one centrifugal blower, one vertical turbine pump to deliver treated water from the clearwell into the distribution system, and a GAC off-gas treatment system to treat the off-gas of the tower. See Exhibit "6" [Well 13 Design Report, p. 4-1].

45. The PTAS for LWD Wells 7A and 8A was designed for a flow rate of 2,400 gpm for the combined wells with two packed towers in series, a concrete clearwell below each tower, one centrifugal blower, two vertical turbine pumps per tower to deliver treated water from the first clearwell into the second tower and from the second tower into the distribution system, and a GAC off-gas treatment system to treat the off-gas of each tower. The PTAS and off-gas treatment for LWD Wells 7A and 8A were designed to mitigate the aesthetic appearance presented to the surrounding residential community. See Exhibit "6" [Wells 7A/8A Design Report, p. 4-1].

46. Residential single-family structures in the Town have a height restriction limited to 30 feet. The area surrounding LWD Wells 7A and 8A is primarily residential and the wells are immediately adjacent to and within 100 feet of the backyards of numerous houses. In designing the PTAS treatment system for LWD Wells 7A/8A, DOW requested that we keep a minimum height to the treatment towers in order to limit the impact to the surrounding residential community. As the residential houses surrounding the LWD Well 7A/8A well field

were limited to 30 feet in height, D&B was tasked with limiting the height of the PTAS treatment tower to no more than 30 feet, which necessitated having two PTAS towers of approximately 25 feet each in height. In addition, the PTAS treatment towers were enclosed in a brick-facade building to be consistent with the existing well house building to mitigate the appearance of the PTAS wellhead treatment system on the surrounding residential community. See Exhibit "16" (photo[s] depicting LWD Wells 7A/8A with well house and PTAS treatment facility).

47. In my experience and practice in water supply engineering, the issue of aesthetics routinely is a factor to be considered as it relates to the design and construction of wellhead treatment systems, especially since those treatment systems are typically in operation for extended periods of time to ensure the protection and quality of drinking water. In addition, I am aware of many PTAS treatment systems, including in Nassau County, which have twin towers in series and/or where the PTAS towers are enclosed in a building. Those types of design decisions are unique to each site and are dependent on factors including the nature of the area (including whether it is residential or commercial), the size of the well field, and the number of supply wells at each site. For example, I am aware that Port Washington Water District Well 6 and Albertson Water District Well 4 both have PTAS treatment systems enclosed in a building. See Exhibit "34" for photographs of the Port Washington Water District Well 6 PTAS treatment system and Exhibit "35" for photographs of the Albertson Water District Well 4 PTAS treatment system.

48. With respect to LWD Well 13, that well field is located on a major thoroughfare on Wantagh Avenue and is immediately adjacent to a recharge basin and right across the street from a large strip mall. Given the mostly commercial layout of that location, the Town did not have the same aesthetic concerns associated with LWD Wells 7A/8A. In addition, due to site

constraints limiting the footprint of the building, two packed towers in series was not feasible. As such, the PTAS treatment system for LWD Well 13 was designed for one tower. While there are some homes near LWD Well 13, the PTAS was designed to be built as close to Wantagh Avenue as possible to reduce the impact to those residents. See Exhibit "17" (photos depicting LWD Well 13 with well house and PTAS treatment facility).

49. I estimated the cost to construct the PTAS for LWD Wells 7A and 8A based on the conceptual design of the system, exclusive of engineering and administrative fees and not adjusted for the cost of labor or market conditions, to be approximately \$4,000,000, plus estimated annual operating and maintenance costs of approximately \$400,000. See Exhibit "6" [Wells 7A/8A Design Report, p. 6-1 and Appendix C].

50. I estimated the cost to construct the PTAS for LWD Well 13 based on the conceptual design of the system, exclusive of engineering and administrative fees and not adjusted for the cost of labor or market conditions, to be approximately \$2,000,000, plus estimated annual operating and maintenance costs of approximately \$155,000. See Exhibit "6" [Well 13 Design Report, p. 6-1 and Appendix C].

51. Upon their completion, the Design Reports were submitted to DOW, who approved them and the recommended course of PTAS treatment with a vapor phase GAC adsorption system to treat the VOC contamination at the LWD Wells.

52. In or about August 2014, D&B, on behalf of and with the approval of DOW, pursuant to Article VI, § 4 of the Nassau County Public Health Ordinance, submitted to the NCDOH applications for the construction of PTAS for LWD Wells 7A/8A and LWD Well 13, together with the respective Well 7A/8A Design Report and Well 13 Design Report. Copies of the Design Reports were also provided to NYSDEC. See Exhibit "33" (NYSDEC000015294-

15372). Thereafter, representatives from NCDOH provided comments to D&B with respect to the respective Design Reports and also made several requests for additional information and documents in consideration of the applications for PTAS wellhead treatment at the LWD Wells. In response to the various requests for information and documents, D&B responded to NCDOH and provided the requisite information and documentation as requested. That information generally included plans and specifications for the PTAS, information concerning the design of the PTAS facilities, Applications for Approval of Plans for Public Water Supply Improvement, and water quality sampling data for the LWD Wells.⁶

53. In November 2014, while the PTAS treatment facility applications for the LWD Wells were pending before NCDOH, a consultant for the Massapequa Water District ("MWD") had received information provided by a Navy consultant regarding VOC detections at Vertical Profile Boring ("VPB") 148.⁷ See Exhibit "36" (D&B000033). The MWD consultant indicated that VPB 148 was located "very close" to LWD Well 13 and had a detection of TCE at 520 ppb at a depth of 530 feet below ground surface. Id. That information was forwarded to Commissioner Reinhardt of the DOW, who had not received it from the Navy or the Navy

⁶ During the pendency of the approval process of the PTAS treatment systems, NCDOH raised certain issues concerning the process. With respect to the PTAS application for LWD Well 13, D&B inadvertently submitted the project completion report and water quality data to NCDOH prior to providing certain information to NCDOH. Once notified, the requested information was immediately provided to NCDOH and shortly thereafter NCDOH issued its approval for the PTAS treatment system for LWD Well 13. With respect to LWD Wells 7A/8A, D&B inadvertently advanced the design of the treatment facility without the air emissions design report, which caused NCDOH to issue a notice of violation. Once the error was realized, the issue was corrected and NCDOH subsequently approved the PTAS treatment system for LWD Wells 7A/8A.

⁷ A vertical profile boring functions essentially in the same manner as a monitoring well, except that it allows for the collection of samples at a multitude of depths.

consultant, and the Commissioner then forwarded it to me for review in connection with the LWD Wells. Id.

54. D&B had not received any reports or data regarding VPB 148, located in the OU-2 plume monitoring well network, nor does VPB 148 appear on any of the maps included with the groundwater monitoring reports which D&B obtained for the period 2010 through 2013. See Exhibit "27" (D&B003593, 3824, 3838, 3847, 3860, 3869, 3885, 3898, 3946, and 4390).⁸

55. On November 17, 2014, I informed Commissioner Reinhardt that my team and I had reviewed the information regarding the VOC detections in VPB 148. See Exhibit "36" (D&B000032). While the information that VPB 148 had a detection of TCE at 520 ppb at about 540 feet below ground in close proximity to the LWD Wells corroborated the maximum influent design concentration of 420 ppb of TCE my team and I had chosen for the PTAS treatment systems, I informed Commissioner Reinhardt that that information did not require any change in the design plans for the PTAS treatment systems. Id. That latest information provided further support that the LWD Wells would likely be impacted by the OU-2 plume at the concentration levels being seen in the surrounding monitoring wells and VPBs. In addition, there was concern that the pumping of the LWD Wells could also potentially draw the OU-2 plume to those wells. However, I informed Commissioner Reinhardt that since the air strippers were designed to remove 440 ppb down to 0.5 ppb, if the raw water concentration was to increase to 520 ppb, the effluent concentration would be around 1.1 ppb, which would not require any change in the design plans awaiting approval from NCDOH. Id.

⁸ See Exhibit "37" (TOH-ARCADIS-000011720) for a point of reference to see the location of VPB 148 in relation of the LWD Wells. It is my understanding that that document was provided by the consultant for Northrop Grumman in response to a subpoena for documents served in this matter.

56. The construction of the PTAS wellhead treatment systems for the LWD Wells required general, electrical and plumbing contractors. My team and I were involved in assisting the Town with the public bidding of the trade contracts. The plans and specifications for the PTAS treatment were publicly advertised under each of the individual trades and bids were submitted by various contractors in each of the trades and the contracts were awarded to contracting firms which were the lowest qualified bidders. The Town Board then issued Notices to Proceed to the contractors with the lowest qualified bids for the general contracting, electrical contracting, and plumbing contracting work associated with the construction of the PTAS treatment systems for the LWD Wells.

57. In or about April 2015, Commissioner Reinhardt requested that I send a letter on behalf of the DOW to Lora Fly at the Navy regarding the VOCs contaminating the LWD Wells. At that time, I was generally aware of the existence of the Public Water Supply Contingency Plan ("PWSCP") which was included as part of the Records of Decision ("ROD") issued by NYSDEC governing the remediation of the commingled OU-2 plume by Northrop Grumman and the Navy. I was not involved in the drafting of the PWSCP nor did I have any prior involvement in its application to the implementation for treatment to remove contamination from VOCs associated with the OU-2 plume from water supply wells. No one from or on behalf of Northrop Grumman or the Navy ever responded to my correspondence sent to NYSDEC (and forwarded to Northrop Grumman and the Navy) on August 19, 2013, or to the correspondence provided by NYSDEC to Northrop Grumman and the Navy on August 23, 2013 or November 4, 2013, regarding VOC contamination detected in the LWD Wells.

58. It is my understanding that from Restoration Advisory Board ("RAB") meetings which are periodically held for the purpose of informing residents of the status of cleanup efforts

conducted by Northrop Grumman and the Navy regarding the OU-2 plume, that the Navy was handling certain activities regarding the OU-2 plume and that Lora Fly was identified as the contact person for the Navy regarding the NWIRP site. As such, on or about April 24, 2015, I sent a letter with a copy of the Design Reports to Lora Fly at the Navy, with copies to Edward Hannon at Northrop Grumman, Doug Garbarini at EPA, Jim Harrington at NYSDEC, and Commissioner Reinhardt. See Exhibit "19" (D&B Letter, dated April 24, 2015, D&B 000129-130, TOH0001262-1263).

59. In my letter, I reiterated what I had previously stated in my correspondence, dated August 19, 2013, and informed the Navy: i) that D&B had been retained by DOW to design VOC treatment systems for the LWD Wells; ii) that the available information suggested that the VOC contamination detected in the LWD Wells originated from the OU-2 plume; iii) that the PWSCP indicated that, at least for LWD Well 13, once trigger values for VOCs associated with the OU-2 plume had been confirmed, that Northrop Grumman and the Navy would commence negotiations with the affected water districts regarding wellhead treatment of the affected public supply wells; iv) that the design of PTAS for the LWD Wells had been completed; v) that while outpost monitoring wells were not installed in connection with LWD Wells 7A and 8A, that the water quality samples collected from those wells exhibited VOC contamination consistent with the OU-2 plume; v) that request was being made for the commencement of negotiations for the design, construction and operation of the required wellhead treatment systems for the LWD Wells; and vi) that the Design Reports were attached to the letter for reference. Id. (D&B Letter, dated April 24, 2015, D&B 000129-130, TOH0001262-1263).

60. On or about May 6, 2015, Lora Fly of the Navy contacted me in response to my letter and requested that I re-send her copies of the Design Reports which I had included in my

April 24, 2015 letter. On that same date, I again provided Ms. Fly with copies of the Design Reports as she requested. See Exhibit "38" (Email from W. Merklin to L. Fly, May 6, 2015 [D&B001006]). At no time did I hear back from Ms. Fly or any representative from or on behalf of the Navy or Northrop Grumman. At no time did any representative from or on behalf of the Navy or Northrop Grumman ever communicate with me concerning the Design Reports or the wellhead treatment designed to remove the VOC contamination from the LWD Wells.

61. Instead, I am aware that on or about June 18, 2015, Nina M. Johnson of the Navy sent a letter directly to Commissioner Reinhardt in which I was not a copy recipient. See Exhibit "20" (Navy Letter, dated June 18, 2015, D&B0000129-130). I recall that at some point, Commissioner Reinhardt informed me of the Navy's response and most likely sent me a copy of the Navy's letter. I recall that the letter from the Navy responded to my letter by questioning whether the VOCs detected in the LWD Wells were attributable to the NWIRP site and suggesting that the source of the VOCs detected in the LWD Wells were unidentified "upgradient non-NWIRP sources." Id. (TOH001259).

62. I also recall that in her letter, Ms. Johnson acknowledged that LWD Well 13 was identified in the PWSCP but she doubted whether the Freon-113 identified in the PWSCP associated with the Northrop Grumman and NWIRP sites and found in the outpost monitoring wells for LWD Well 13 and in LWD Well 13 itself "emanated from the NG Bethpage and/or NWIPR Bethpage facilities." Id. (TOH001260).

63. In my opinion, the response from the Navy confirmed its unwillingness to comply with my understanding of the PWSCP and commence negotiations with the Town to address the wellhead treatment needed to remove the VOC contamination from the LWD Wells. My understanding of the RODs requiring the PWSCP was to identify public water supply wells that

were or may be impacted by the migration of the OU-2 plume within a 30-year period and to establish outpost monitoring wells specifically to provide an approximately five-year early warning prior to the detection of VOCs in the potentially affected public water supply wells. In my opinion, the criteria of the PWSCP were satisfied as to the LWD Wells - i) LWD 13 was specifically included in the PWSCP; ii) the VOCs detected in the LWD Wells, including Freon-113, PCE, 1,1-DCA, and Chloroform, were all identified in the PWCP as VOCs associated with the commingled OU-2 plume emanating from the Northrop Grumman and NWIRP sites; iii) the "trigger value" for Freon-113 was confirmed in outpost monitoring well BPOW 4-1 installed specifically to provide an early warning of the arrival of the OU-2 plume at LWD Well 13; and iv) the LWD Wells were impacted by the OU-2 plume and needed treatment for the removal of VOC contamination. Yet, despite the criteria of the PWSCP being met, neither the Navy nor Northrop Grumman were willing to commence discussions with the Town to address the wellhead treatment needed to allow the Town to keep the LWD Wells in service and to remove VOC contamination from the LWD Wells to protect the drinking water provided to the Town's residents.

64. Moreover, all of the information requested by the Navy would have already been in its possession as a result of the groundwater modeling and analysis prepared on its behalf in connection with the PWSCP and the placement of the outpost monitoring wells, including Outpost Monitoring Wells BPOW 4-1 and 4-2 intended to provide early warning of the OU-2 plume reaching LWD Well 13. In fact, it is my understanding that it was Northrop Grumman and the Navy who developed the PWSCP and determined from groundwater modeling they conducted that Outpost Monitoring Wells BPOW 4-1 and 4-2 should be located in a northeast direction from LWD Well 13 since the projected impact from the OU-2 plume to LWD Well 13

would be coming in a south, southwest direction to that well. See Exhibit "37" (map depicting placement of BPOW 4-1 and 4-2). In addition, Northrop Grumman and the Navy were in possession of the water quality sampling data from the hundreds of monitoring wells and vertical profile borings installed to monitor the off-site migration of the OU-2 plume.

65. I, along with Commissioner Reinhardt, viewed the response from the Navy as confirming that the Navy (and Northrop Grumman) were not willing to accept their responsibility under the PWSCP to reimburse the Town for wellhead treatment for VOC contamination in the LWD Wells from the OU-2 plume.

66. The Town's plans to construct the PTAS treatment systems for the LWD Wells were required to be and were approved by NCDOH. On February 26, 2016, NCDOH approved the LWD Well 13 Design Report DAR-1 Analysis⁹ which was completed to determine the potential impact of emissions on nearby receptors using the design influent concentrations. See Exhibit "39", NCDOH DAR-1 Analysis Approval, LWD Well 13 (February 26, 2016) (D&B001420-21). In that DAR-1 Analysis Approval, NCDOH "noted that TCE has not been detected in Well 13 raw water and that the Design Maximum concentrations have been selected based on the maximum measured concentration of each of the contaminants upstream of Well 13 as provided by the NYSDEC for the Grumman OU-2 plume of groundwater contamination." Id. at D&B001420.

67. On March 30, 2016, NCDOH then issued its approval of the Design Report for the PTAS treatment system for LWD Well 13, dated August 2014 and revised February 2016. See NCDOH Approval of LWD Well 13 Design Report, March 30, 2016 (TOH006187, 6418-19). The NCDOH Approval of the LWD Well 13 Design Report noted that Freon-113 first

⁹ The Division of Air Resources ("DAR") of the NYSDEC issues Guidelines for the Evaluation and Control of Ambient Air Contaminants.

appeared in LWD Well 13 in 2012 and in July 2013 it neared the MCL of 5.0 ug/l; referenced the LWD Well 13 Design Report's finding that the OU-2 plume from which the Freon-113 originates contains up to 420 ug/l of TCE, which, if the plume continues as it has been, may ultimately reach Well No. 13; and that the "Grumman Superfund site was identified and considered as a possible source of contamination." Id. at TOH006418. NYSDEC and NYSDOH were notified of the NCDOH's Approval of the Design Report for the LWD Well 13 PTAS treatment system. Id. at TOH006419.

68. On June 24, 2016, NCDOH issued, on behalf of NYSDOH, an Approval of Completed Works For Public Water Supply Improvement which approved the PTAS with vapor phase GAC off-gas treatment system to treat the VOCs from the raw water of LWD Well 13. See Exhibit "23", Approval of Completed Works Certificate (TOH007016-18). NCDOH approved the PTAS for the removal of VOCs from the raw water of LWD Well 13 as well as the 12,000 lb. vapor phase GAC off-gas treatment to treat the PTAS tower's air emissions. Id. at TOH007018. The design contaminants and influent concentrations approved by NCDOH were 420 ug/l of TCE and 8.6 ug/l of Freon-113 and the design effluent concentration for each compound of 1.0 ug/l or less. Id. The approval was subject to DOW assuring that emissions from the LWD Well 13 air stripping tower are discharged through vapor phase carbon units and that the facility be operated in compliance with Subpart 5-1 of the NYS Sanitary Code and Article VI of the Nassau County Public Health Ordinance. Id. The Approval of Completed Works certificate by NCDOH was issued based on the project certification report; satisfactory water quality results obtained by LWD and NCDOH; and the LWD/NCDOH joint inspection of the completed work. Id. at TOH007016. NYSDEC and NYSDOH were notified and provided

copies of the Approval of Completed Works certificate for the PTAS treatment system for LWD Well 13. Id. at TOH007017.

69. On April 14, 2016, NCDOH approved the LWD Well 7A/8A Design Report DAR-1 Analysis. See Exhibit "40", NCDOH DAR-1 Analysis Approval, LWD Well 7A/8A (April 14, 2016) (TOH006416-17). In that DAR-1 Analysis Approval, NCDOH "noted that TCE has not been detected in the raw water, however it is estimated that up to 420 ug/l of TCE may eventually impact the Well 7A & 8A raw water." Id. at TOH006416. As such, "[t]he design influent VOC concentrations have been selected based on the maximum measured concentrations of each of the contaminants upstream of Wells 7A and 8A as provided by the NYSDEC for the Grumman OU-2 plume of groundwater contamination." Id.

70. On July 19, 2016, NCDOH then issued its approval of the Design Report for the PTAS treatment system for LWD Wells 7A/8A, dated August 2014 and revised February 2016. See NCDOH Approval of LWD Well 7A/8A Design Report, July 19, 2016 (TOH006080-81, 6094). The NCDOH Approval of the LWD Well 7A/8A Design Report noted that LWD Well 7A had shown increasing levels of 1,1-DCA since 2012; that LWD Well 8A had shown increasing levels of Freon-113 and PCE since 2012; referenced the LWD Well 7A/8A Design Report's finding that "the Grumman Superfund site, located 2 to 2.5 miles upgradient of the Levittown Water District wells, as a possible source of well contamination"; and that "the plume from which the aforementioned compounds originate also contains up to 420 ug/l of Trichloroethene (TCE)." Id. at TOH006080. The NCDOH Approval of the LWD Well 7A/8A Design Report also noted that the PTAS treatment system "will consist of two (2) indoor aluminum towers in series designed for a maximum flow of 2,400 gpm and influent concentrations of 420 ug/l of Trichloroethylene (TCE)." Id. NYSDEC and NYSDOH were

notified of the NCDOH's Approval of the Design Report for the LWD Well 7A/8A PTAS treatment system. Id. at TOH006081.

71. On January 12 and April 25, 2018, NCDOH approved the temporary operation of the PTAS treatment system for LWD Wells 7A/8A pending completion of chemical treatment improvements and reporting of indoor air, outdoor air and vapor phase carbon emission quality. See Exhibit "24", Approval of Completed Works Certificate, September 20, 2018, p. 1. Thereafter, on September 20, 2018, NCDOH issued, on behalf of NYSDOH, an Approval of Completed Works For Public Water Supply Improvement which approved the PTAS with vapor phase GAC off-gas treatment system to treat the VOCs from the raw water of LWD Wells 7A/8A. Id. at p. 3. NCDOH approved the PTAS consisting of two towers operated in series for the removal of VOCs from the raw water of LWD Wells 7A/8A as well as the vapor phase GAC off-gas treatment to treat the PTAS towers' air emissions. Id. The design influent concentrations approved by NCDOH were 420 ug/l of TCE, 5.8 ug/l of 1,1-DCA, 8.6 ug/l of Freon-113, and 12 ug/l of PCE and the design effluent concentration for each compound of 1.0 ug/l or less. Id. The approval was subject to DOW assuring that emissions from the LWD Wells 7A/8A air stripping towers are discharged through vapor phase carbon and that the facility be operated in compliance with Subpart 5-1 of the NYS Sanitary Code and Article VI of the Nassau County Public Health Ordinance. Id. The Approval of Completed Works certificate by NCDOH was issued based on the certification application; satisfactory water quality testing results; the February and April 2018 reports of the chemical treatment improvements; and the receipt of the Wells 7A and 8A PTAS Air Quality Monitoring Report detailing the results of the air quality monitoring conducted at the facility in May and June 2018. Id. at p. 1. NYSDEC and NYSDOH were

notified and provided copies of the Approval of Completed Works certificate for the PTAS treatment system for LWD Wells 7A/8A. Id. at p. 2.

72. The PTAS treatment systems for the LWD Wells were constructed in accordance with the Design Reports and were put in operation in accordance with the approvals issued by NCDOH on behalf of NYSDOH. With the PTAS treatment systems in operation at the LWD Wells, raw water is pumped up from the ground and pushed through the packed tower aerator where air flow removes VOCs from it. The water then falls into the clearwell storage vessel and when the clearwell reaches a specific level, a booster pump draws the water from the clearwell and pushes it directly out to the distribution system.

73. The actual costs incurred by the Town in connection with the design and construction of the wellhead treatment system for LWD Wells 7A/8A are approximately \$5,560,301 and for LWD Well 13 are approximately \$2,780,002. See Exhibit "6" (expert report). The actual costs include the engineering and administration costs and are the actual bid costs of the contractors. After the bids were awarded, the construction costs were controlled and construction was completed for less than the original bid prices with no cost overruns. Based on my extensive experience in water supply engineering and designing wellhead treatment systems for the removal of VOC contamination from water supply sources, it is my opinion that the costs incurred to design, construct and operate the PTAS treatment systems with vapor phase GAC off-gas treatment for the removal of VOC contamination from the LWD Wells are considered typical and reasonable and consistent with the costs to design, build and operate similar wellhead treatment systems in Nassau County, New York, including the many similar wellhead treatment systems which I have personally designed and had built as well as similar treatment systems my colleagues at D&B designed and had built. The bid prices and the amounts actually paid in

connection with the wellhead treatment systems for the LWD Wells are comparable to the bid prices and amounts actually paid by other water suppliers for whom I and D&B have designed wellhead treatment systems to remove VOC contamination from water supply wells.

74. It is my understanding that the wellhead treatment systems for the LWD Wells are currently operating as designed and continue to remove VOCs from the raw water of the LWD Wells so that the Town can and is providing drinking water to its residents in compliance with the established standards and requirements for drinking water quality. The expectation is that the wellhead treatment systems will continue to operate as intended and remove VOC contamination from the LWD Wells beyond the foreseeable future.

Dated: Woodbury, New York
June 17, 2021



WILLIAM D. MERKLIN, P.E.